CONCLUSIONS HMR is a microcirculatory specific value that is independent of the presence of a stenosis, especially in vessels not receiving collateral supply. These results indicate that HMR can indeed be used clinically to assess microcirculatory function regardless of the presence of an epicardial coronary stenosis.

CATEGORIES IMAGING: FFR and Physiologic Lesion Assessment

KEYWORDS Microvascular dysfunction, Microvascular resistance, Stable coronary artery disease

TCT-305

Accuracy of Fractional Flow Reserve (FFR) Measurements in Clinical Practice – Observations from a Core Laboratory Analysis

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BACKGROUND The accuracy of Fractional Flow Reserve (FFR) measurement in routine clinical practice is unknown.

METHODS The CONTRAST (Can cONTrast Injection Better Approximate FFR compAred to Pure reSTing Physiology) study was a large multi-center trial of FFR measurements with contrast (cFFR), intravenous (IV) and intracoronary (IC) adenosine with duplicate measurement for each hyperemic agent that was analyzed by an independent core laboratory (CL). CL analysis included independent calculation of FFR, wave-form analysis of the aortic and distal coronary pressure and evaluation of pressure drift of the coronary pressure to assess the incidence, pattern, and causes of suboptimal FFR measurements.

RESULTS A total of 750 pts were enrolled in the study and 3366 FFR tracings were analyzed by the CL (mean of 4.5 tracings per pt). The overall agreement between CL calculated vs. operator reported FFR was excellent (Bland-Altman 0.003±0.019) with only 25 (3.9%) pts showing an FFR difference of >0.03. Pullback data was available in 605 (80.7%) pts of which 117 (19.3%) pts had evidence for signal drift defined as pre-specified Pd/Pa <0.97 or >1.03. Among the remaining 2807 tracings (633 pts) without evidence of signal drift, 160 (5.7%) tracings were noted to have damping of the aortic wave form and 103 (3.7%) had distorted aortic or distal coronary wave-forms. Overall, 150 (20%) pts had signal drift or an abnormal wave-form, affecting all tracing in 33 pts and signal drift by pullback in 117 pts. Predictors of aortic pressure damping and distorted wave forms are presented in the Table. However, there was no significant difference noted in the overall agreement between cFFR and adenosine FFR when using all tracings (AUC 85.9%, 0.930) or only CL accepted tracings (AUC 85.5%, 0.929).

	Distorted Wave Form		p-Value
	Present	Absent	
Per patient			
5 Fr guiding catheter	53.3% (32/60)	14.7% (84/573)	<0.0001
Per tracing			
During FFR with contrast	63.1% (65/103)	45.0% (1146/2544)	<0.0001
During FFR with IC Adenosine	4.9% (5/103)	30.9% (786/2544)	<0.0001
	Aortic Pressure Damping		p-Value
	Present	Absent	
Per patient			
5 Fr guiding catheter	9.2% (6/65)	19.4% (110/568)	0.045
Per tracing			
During FFR with IC Adenosine	50.6% (81/160)	30.9% (786/2544)	<0.0001

CONCLUSIONS This is the first reported CL analysis of FFR measurements demonstrating an overall excellent agreement between operator reported and CL calculated FFR. However, a substantial number of pts were found to have either signal drift on pullback (15.6%) or artifacts (4.4%); this did not alter the overall study results and its clinical relevance remains unknown. Attention to detail is critical when measuring FFR to ensure accurate results.

CATEGORIES IMAGING: FFR and Physiologic Lesion Assessment

KEYWORDS Fractional flow reserve

TCT-306

Hemodynamic Assessment Of Low Flow, Low Gradient Severe Aortic Stenosis With Preserved EF Using A Pressure Wire

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BACKGROUND Current guidelines discourage aortic stenosis (AS) evaluation by direct pressure measurement if echocardiography (echo) is adequate. However several studies show sizable differences between echo and catheterization (cath) lab measurements. Low flow/ low gradient (LF/LG) severe aortic stenosis (AS) with preserved EF constitutes a real challenge with no clear method to confirm the severity of AS in this group. Normal flow/ low gradient AS with preserved EF is considered as echocardiography miscalculation by guidelines. Using pressure wire for aortic stenosis assessment may offer a safe and higher quality technique to assess the severity of AS in LF/LG and NF/LG AS with preserved EF.

METHODS 104 Sequential patients with AVA 50% underwent right and left heart cath by two operators with pressure gradients via left ventricular (St. Jude) pressure wire and ascending aorta catheter. Of these, there were 57 with high gradient (HG), 33 with LF/LG and 14 with NF/LG. Cath derived values were based on simultaneous pressure wire recording of left ventricular pressure and fluid filled pressure catheter recording of aortic pressure measured > 5 cm above the valve. Cardiac output was calculated by thermodilution.

RESULTS While the classification of severe AS by cath and echocardiography was concordant in 96% of HG AS patients (55/57), there was large discrepancy of this classification in patients with LF/LG and NF/LG. Severe AS was confirmed with cardiac in 67% of LF/LG patients (22/33) and 43% of those with NF/LG (6/14). No clinical strokes or TIA were observed in the 30 days after procedure in any of the patients.

CONCLUSIONS Invasive hemodynamic assessment of AS can be beneficial in identifying true severe AS in patients with LF/LG and NF/LG severe AS with preserved EF.

CATEGORIES IMAGING: FFR and Physiologic Lesion Assessment

KEYWORDS Aortic stenosis, Pressure wire

TCT-307

Validation of a novel catheter for thermodilution-derived measurement of absolute coronary blood flow and microvascular resistances

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BACKGROUND While coronary angiogram detects only 5 to 10% of the volume of coronary tree, no direct measurement is currently available to measure the microcirculation, which represents the remaining 90 to 95%. A novel infusion catheter was developed to directly measure absolute coronary blood flow and microvascular resistances.

METHODS A novel monorail infusion catheter with a double lumen associated with a pressure temperature sensor wire is able to assess coronary blood flow and microvascular resistances. Coronary blood flow is calculated with the following formula Q=Qi x 1,08 x Ti/T, Q is the coronary flow (mL/min), and Qi the infusion rate of saline at room temperature (mL/min), Ti is the saline infusion temperature (Celsius degree) and T is the temperature at the distal part of the coronary artery. Myocardial resistances are equal to the distal pressure divided by the absolute myocardial flow in mmHg.min.mL-1. Hyperemia was obtained with the infusion of saline itself. Test retest stability of the measurements was studied after re-instrumentation of the coronary artery.

RESULTS During coronary angiography, we performed in 30 patients coronary blood flow and myocardial resistances in 54 vessels and test/retest measurements in 34 vessels. There were 22 LAD, 12 LCx and 20 RCA. Mean hyperemic coronary flows in the LAD, the circumflex artery and the RCA were respectively: 170±74, 141±42 and 165±39 mL/min. Mean microvascular resistances in the LAD, the LCx and the RCA were respectively: 0.47±0.17, 0.59±0.15 and 0.51±0.15 mmHg.min.mL-1. Test/retest stability of the measurements were studied in 34 vessels after re-instrumentation of the coronary artery showed a good reproducibility for both coronary blood flow and microvascular resistances